

What is claimed is:

1. A gas separation apparatus, comprising:
  - a cyclone or hydroclone having a gas outlet and a discharge outlet;
  - a containment vessel in communication with the gas outlet and in5 communication with the discharge outlet; and
  - a purge gas stream in communication with the discharge outlet and in communication with the containment vessel.
2. The apparatus of Claim 1, wherein the gas separation chamber is a cyclone adapted for the separation of gas from a gas/solid mixture.
- 10 3. The apparatus of Claim 1, wherein the gas separation chamber is a hydrocyclone adapted for the separation of gas from a gas/liquid mixture.
4. The apparatus of Claim 1, wherein the containment vessel is pressurized.
5. A method for separating gas from a first gas/solid or gas/liquid mixture, comprising the steps of:
  - 15 introducing the first gas/solid or gas/liquid mixture into a cyclone or hydroclone, respectively;
  - separating the first mixture into a gas overflow and a discharge underflow;
  - introducing a purge gas stream to the discharge underflow to create a second mixture comprising purge gas and gas displaced from the discharge underflow; and20 merging the second mixture with the gas overflow.
6. The method of Claim 5, wherein the first mixture is a gas/solid mixture.
7. The method of Claim 5, wherein the gas is chlorine and the solid is titanium dioxide.
8. The method of Claim 5, wherein the first mixture is a gas/liquid mixture.
- 25 9. The method of Claim 6, wherein the discharge underflow comprises a majority portion of solids and a minority portion of gas.
10. The method of Claim 7, wherein the discharge underflow comprises a majority portion of liquid and a minority portion of gas.

11. The method of Claim 5, wherein the purge gas is nitrogen or carbon dioxide.